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Mitsubishi EVOX GSR M800 Plug-In Installation

This document refers to MoTeC M800 Plug-In installations to Mitsubishi Lancer EVOX RS and EVO X GSR using the EVOX adaptor 13014A. This document covers the installation of the M800 with the standard centre diff controller or alternatively fitting a MDC2 in its place. When fitted with a M800 plug in ECU the cars cruise control and immobiliser will not be functional

Introduction

The MoTeC M800 Plug-In ECUs are an assembly of a MoTeC M800 ECU with an adaptor board in a single enclosure that allows it to plug directly into the cars original wiring. The ECU functionality is the same as the standard MoTeC M800 with the exception of peak and hold injector drive function; an M800 Plug-In can only drive low impedance injectors with a suitable resistor or high impedance injectors. The Mitsubishi EVO X uses high impedance injectors as standard.

The MoTeC M800 Plug-In adaptor board is vehicle specific and there are links on the adaptor board to allow for variations in different models and functional requirements of the user. The pre-installed start file should be sufficient to start the engine prior to tuning.

To ensure that the correct adaptor board, link setup and start file is provided, full details of the vehicle must be quoted when ordering. Details should include the factory ECU part number, year, model and version.

Important Note!

The M800 Plug-In ECU has been made to the highest standards and will provide reliable performance but should not be dismantled in any way due to the risk of damage. Unlike previous M800 Plug-In ECUs, separating the two halves of the case will also separate the connector between the two circuit boards which can bend connector pins. If the link setup needs to be changed this should only be done by an authorised MoTeC dealer.

ESD – Antistatic

All necessary antistatic precautions must be taken while handling circuit boards.

Inactive Functions

Cruise Control

With a M800 Plug in ECU installed in an EVOX the cruise control functions will be inactive and the car will not operate in cruise control mode. Some of the curse control buttons may be available as general purpose switched inputs (See pin out information)

Alarm/Immobiliser

With a M800 Plug in ECU installed in an EVOX security functions will be inactive and the car will operate with the key in the on position

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Parts Required

MoTeC Part No.	Description	Notes
13014A	EVO X GSR M800 Plug-In ECU	MoTeC M800 ECU and Adaptor board assembly.
28116	Cam Control Upgrade	
28112	M800 Drive by Wire Upgrade	Drive by wire throttle control
Optional		
MoTeC Part No.	**Description**	**Notes**
28102	M800 Wideband Lambda Upgrade	ECU upgrade required to control a wideband lambda sensor (free for the first 8 hours of engine running time).
28101	Data Logging Upgrade	1 Mb ECU data logging (free for the first 8 hours of engine running time).
26105	Advanced Functions Upgrade	ECU upgrade to enable the following functions: Over-run boost (ORB), Launch Control, Traction Control, Gear Change Ignition Cut.
28117	Over-run Boost Upgrade	ECU upgrade to enable Over-run boost (ORB) only without other advanced functions.
14016	MDC2	Replacement centre diff controller
61134	EVO X Lambda Loom	A loom to connect a wideband lambda sensor
61135	EVO X Knock Loom	A loom to connect a knock sensor
53121	EVOX Knock Module	An EVOX specific version of the OKM
61231	EVOX M800 CAN Loom	A loom to provide a CAN connection directly to the M800

Drive by Wire Throttle

All Mitsubishi EVO X models are fitted with a Drive by Wire Throttle (Electronic Throttle). For safety reasons the setup for the Drive by Wire throttle control must be done by a MoTeC dealer and must match the vehicle correctly.

Setup Parameters

The control parameters **must** be set up in accordance with the setup sheet for the particular DBW motor. These setup parameters are provided by MoTeC and **must not** be altered. Contact MoTeC for the relevant MoTeC document.

The start file supplied with the ECU will have the correct settings configured already. However, the scaling for the throttle pedal and throttle positions will need to be set on each installation. If these are not set the throttle may not operate or may go into error and stop working.

Setting the High and Low for TP & TP2

- **On the Adjust menu, click Sensor Setup, and then click Throttle Position Hi/Lo**

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The throttle must not move while setting the High and Lo value on each of the two pots on the Throttle Body (TP and TP2). This is to ensure that both pots read the same - otherwise a diagnostic error may occur.

It is recommended that one or both of the Auxiliary output wires that control the DBW motor are disconnected whenever calibration is being carried out.

Using a feeler gauge of approx. 0.5 mm, press on the butterfly until it clamps the feeler gauge and then set the Lo position for TP and TP2. Then move the butterfly to full throttle, i.e. 90 degrees. Ensure not to close the throttle butterfly to its physical stop, or open the butterfly past the fully open position. This will upset the control and cause the servo to draw excessive current.

Setting TPD & TPD2 High and Low

- **On the Adjust menu, click Sensor Setup, and then click Throttle Position Hi/Lo**

The TPD and TPD2 Hi and Lo positions are set using the foot pedal. Again, ensure that the pedal doesn't move while setting the Lo and Hi position on each pot.

When setting the TPD and TPD2 Hi position make sure the pedal is fully depressed taking into account floor carpet and pedal flex. Any over travel during operation will cause an error.

Error Detection

If any error is detected, the power to the servo motor is shut off. This includes both the high and low side drivers so that a single short to 0 V or +12 V, either in the wiring or the driver, will shut off the power. When the power to the throttle body is removed, springs will return it to a default position of approximately 10%. If the control loop has shut down, the only way to restart it is to cycle the power (ECU re-start).

Note: during DBW shut-down, Engine RPM is limited to 2500 rpm regardless of throttle opening.

DBW Idle Control

The DBW throttle control also has an associated 'DBW Idle Speed' control which can be set up on Auxiliary Output 2.

- **On the Adjust menu click Auxiliary Output Functions, and then click Auxiliary Out 2**
- **Click Functions and Enter 6 (6: Drive by Wire Idle Speed Control)**

The idle speed is maintained by a PID control loop. Experience in this area is essential for determining the correct operating parameters.

M800 CAN

The EVOX makes extensive use of a CAN network. Many of the factory fitted controllers share information, sensor values and calculated control parameters across a 2 wire CAN bus network. When the standard engine ECU is replaced with the M800 plug in it must be set in such a way as to transmit required messages on the CAN bus to control many other devices on the car. Communications between the M800 and the laptop is also performed over the same CAN network. If any other devices are added to the CAN bus they must be compatible with all the other

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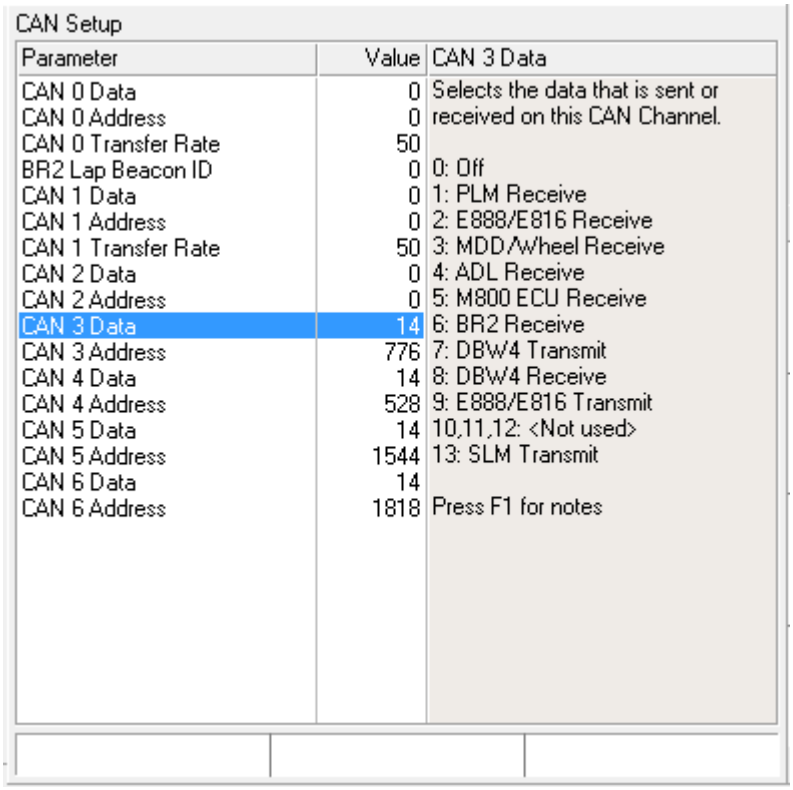
equipment on the car. This section covers all the settings required, and their function. The M800 EVOX start file is pre set with CAN settings and parameters to transmit and receive the required CAN messages.

Setup

The M800 is capable of transmitting CAN messages to control many devices on the car. M800 version 3.52U or later must be used to transmit and receive the required CAN messages. In order activate the transmission and reception of these CAN messages the M800 must have the following settings in the parameter screen: Adjust, general setup, communications CAN setup.



CAN 3 Data, CAN 4 Data, CAN5 Data and CAN 6 Data must be set to 14. CAN 3 Address must be set to 776. CAN 4 Address must be set to 528, CAN 5 Address must be set to 1544, CAN 6 Address must be set to 1818

Standard Centre Diff & AYC

The standard centre diff controller receives a CAN message from the M800 that contributes to the total amount of centre diff lock applied. This message has a large influence on the amount of centre diff "preload" used when the car is driven in a straight line. If the car is experiencing braking, cornering or wheel spin these factors tend to play a greater role in controlling the amount of lock applied. This message must not be a constant as this can cause an error and the centre diff controller to go into limp mode. The diff lock request is calculated from a 3d table associated with AUX7 output. AUX7 is set to mode 3, with parameters of min duty set to "0" and max duty set to "100", this is pre configured in the appropriate M800 start file.

A typical diff lock table is shown bellow. The table is scaled 0%-100% with 100% providing highest preload possible.

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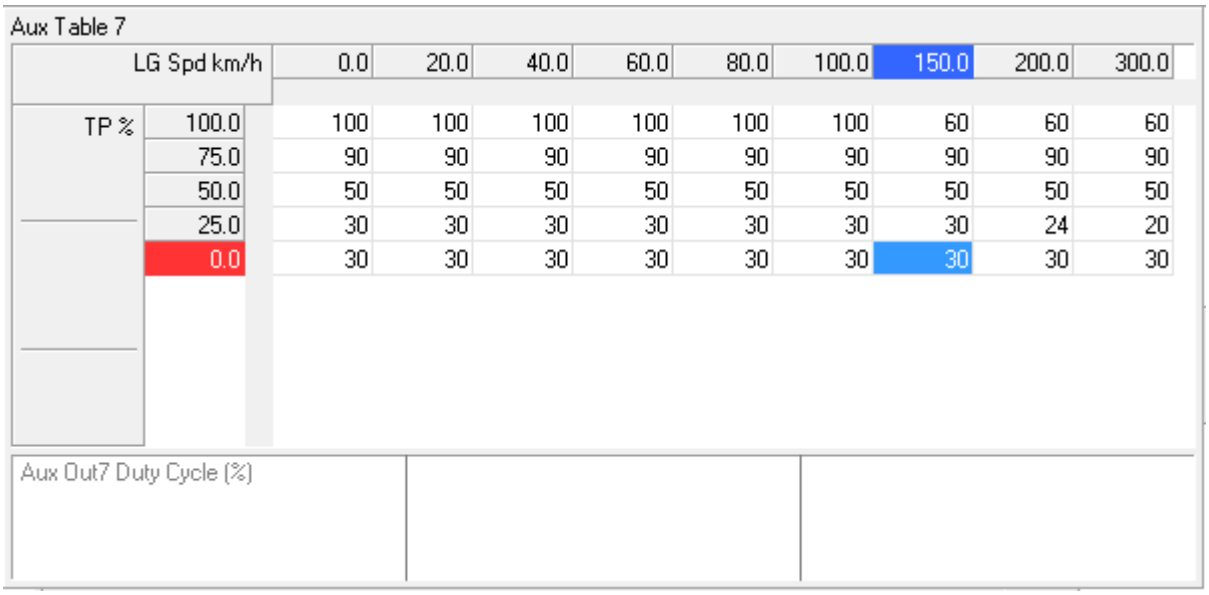

ABS (GSR Only)

Beyond the basic CAN setup parameters (see above) no setup is required to operate the standard ABS unit.

AYC (GSR Only)

Beyond the basic CAN setup parameters (see above) no setup is required to operate the standard cerntre diff controller. On the GSR spec cars this centre diff ECU controles the functions of the AYC (active rear diff).

Wheel Speed

Wheel speed channels can be directly received form the ABS module (GSR) or the WSS module (RS).

CAN slot 6 needs to be configured in the mode shown above. Wheel speed can then be configured in the input setup as shown:

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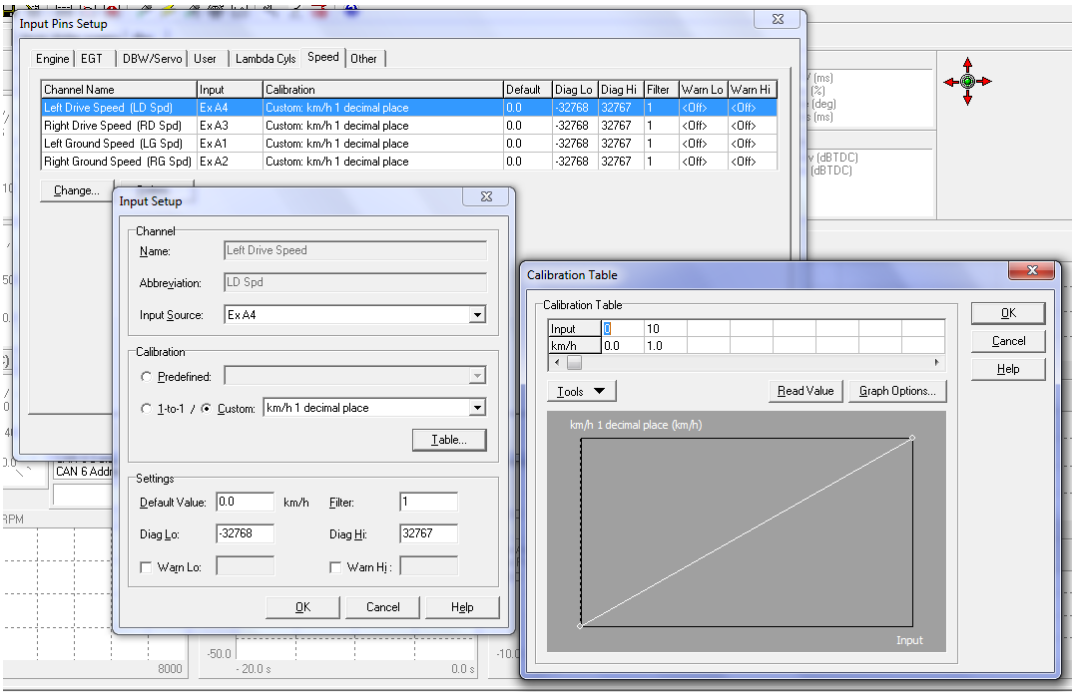
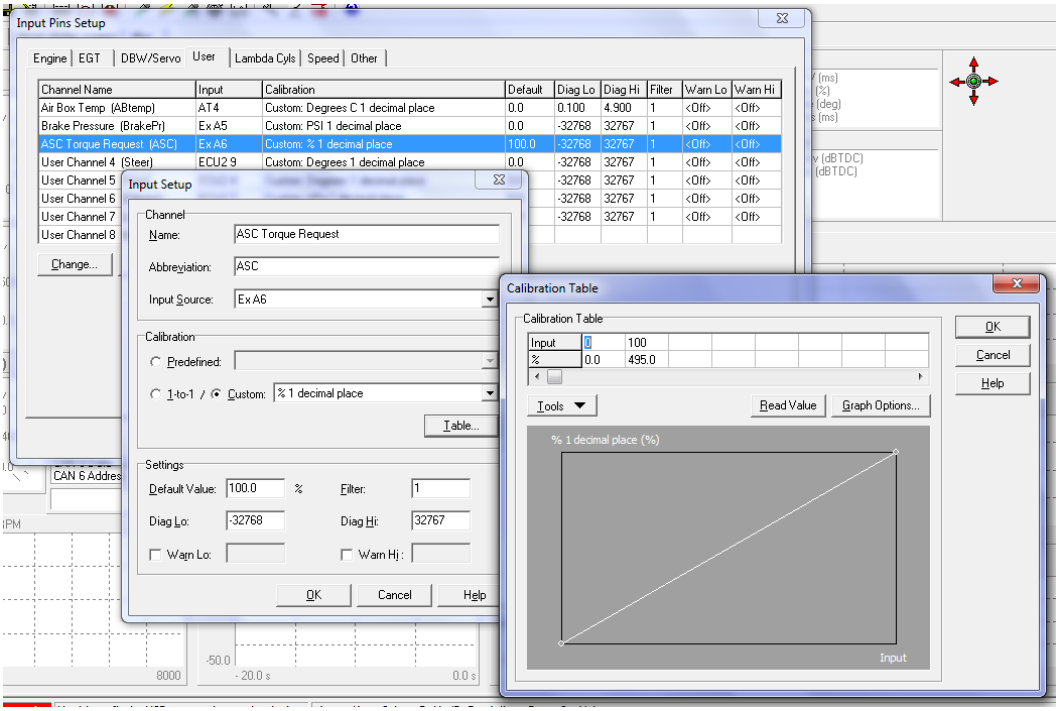


Stability control (GSR Only)

Beyond the basic CAN setup parameters (see above) no setup is required to operate the standard stability control (ASC) unit.

A torque down request is available to be received on CAN from the ABS unit. This channel is configured in the input set up as shown below and can be used as a compensation applied to the drive by wire throttle translation



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Thematic Fan

The thermatic fans on the EVOX are not directly controlled by the engine ECU but rather by the ETAS ECU (body computer) via CAN.

The M800 Plug-In output AUX8 is configured in "Thermo fan table" mode 133 and the duty of the output is transmitted on the CAN bus. The ETAS ECU receives the CAN message from the M800 requesting various fan speeds.

Any duty output from the M800 Plug-In between 0% and 50% will translate in a request to run the fan at low speed. Any duty above 50% will translate in a request to run the fan at high speed.

In addition, a request to operate the fan at high speed will be sent if the M800 Plug-In ECU if the internal temperature exceeds 85 degrees Celsius to reduce under bonnet temperatures.

Note: The output AUX8 is not physically connected to any ECU pin, but is only used to generate the duty cycle percentage channel to transmit on CAN.

Instrument Cluster Operation

The instrument cluster on the EVO X is not directly controlled by the engine ECU but by the ETAS ECU (body computer) via CAN. The ETAS ECU receives CAN messages from various devices on the car including the M800, and then transmits CAN messages to control the instrument cluster. The CAN messages required are preset in the M800. For the oil pressure warning light to work digital input 4 must be configured to monitor the oil pressure switch.

Air Conditioning (GSR only)

Air conditioning clutch request is transmitted by the climate control module on the CAN bus and is automatically received by the M800 when the CAN 6 Data is set to 14 and CAN 6 Address is set to 1818. No further setup is required to receive A/C request. The air conditioner clutch is controlled conventionally via injector output 6. Injector output 6 duty cycle is also transmitted on the CAN bus to allow the body computer to control the condenser fans.

Spare CAN

With the M800 plug in ECU configured to support CAN the M800 has a minimum of one spare CAN "slot". This spare CAN "slot" can be configured to be on either CAN 0 Data or CAN 1 Data and can be used for auxiliary functions transmit data to a dash or receive data from a PLM

CAN-PC Communications using standard diff controller

Communication with a PC and the M800 Plug-In ECU is performed using the cars factory CAN bus.

A UTC (USB to CAN converter) is required to connect a PC to the car. The UTC connects to CAN HI and CAN LO. This connection can be made by splicing into pins 91 and 90 (see pin out). This connection can also be made to the spare pin locations 55 & 56. A loom is available part # 61231 that is pre terminated in EVOX loom pins and has a connector to accept a UTC. The loom needs to be fitted to the main connector of the M800 ECU. The pin anti back out plate must be removed and the pins are inserted from the wire side of the main connector.

- **Pin 55 CAN LO Green**

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- **Pin 56 CAN HI White**

The Mitsubishi CAN bus runs at a slower speed than the default MoTeC CAN bus speed. This default must be changed in MoTeC's M800 Manager software to match the Mitsubishi CAN bus speed.

- **On the *Tools* menu, click *Options***
- **Click the *Communications* tab and select 500kbit for the CAN Data rate**

Consult MoTeC for information on adding other MoTeC devices to the CAN bus.

Note: Software upgrades to all EVOX plug in M800 ECUs can be performed while connected to the cars CAN bus. The upgrade process on these ECUs has been revised to operate at the cars 500kbit CAN bus. It is recommended that the car's ignition coils are unplugged during the upgrade process.

CAN-PC Communications using MDC2 diff controller

Communication with a PC and the M800 Plug-In ECU is performed using the cars factory CAN bus.

A UTC (USB to CAN converter) is required to connect a PC to the car. The MDC2 is supplied with a loom that directly plugs into a UTC. PC communications are performed from this connection for both the MDC2 and the M800.

The Mitsubishi CAN bus runs at a slower speed than the default MoTeC CAN bus speed. This default must be changed in MoTeC's M800 Manager software to match the Mitsubishi CAN bus speed.

- On the *Tools* menu, click *Options*

- Click the *Communications* tab and select 500kbit for the CAN Data rate

Consult MoTeC for information on adding other MoTeC devices to the CAN bus.

Note: Software upgrades to all EVOX GSR plug in M800 ECUs can be performed while connected to the cars CAN bus. The upgrade process on these ECUs has been revised to operate at the cars 500kbit CAN bus. It is recommended that the car's ignition coils are unplugged during the upgrade process.

Optional Installation

Wideband Lambda Measurement

Wideband Lambda can be measured directly into the EVO X M800 Plug-In ECU. Unlike other M800 Plug-In ECUs the Lambda sensor is wired on spare pins of the main connector, so that the ECU can remain sealed. A loom is available that is pre terminated in EVOX ECU pins and is fitted with a 8 pin DTM connector designed to fit to MoTeC's existing range of sensor adaptor looms. These looms have the following part numbers:

- **61134 EVOX Lambda Loom**
- **61103 LSU 4.0 Sensor loom**
- **64009 LSU 4.2 Sensor loom**
- **64010 LSU 4.9 Sensor loom**
- **61105 NTK Sensor loom**

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The EVOX Lambda loom must be fitted to the ECU main connector. The Plug must be removed from the ECU and the white anti back-out plug must be released. The wires are then inserted into the wire side of the connector according to the pin out:

- **Pin 63 Heater +12v Grey**
- **Pin 64 Heater (AUX6) White**
- **Pin 47 LA2-S Black**
- **Pin 48 LA2-P Green**
- **Pin 32 0 V-ENG Yellow**

Consult the EVO X Lambda wiring loom data sheet for more information. Lambda can also be measured via the CAN bus using a PLM. Lambda cannot be measured using a LTC/LTCD Contact MoTeC for more information.

Knock Measurement

The EVO X M800 Plug-In can be optionally ordered with an OKM (Onboard Knock Module, MoTeC Part No. 53121). The OKM differs from previous models in that the knock and window monitor signals are accessed from the ECU main connectors. The OKM can be ordered with the Plug in M800 and will be shipped pre configured and installed. The OKM can be purchased at any time but the plug in M800 must be returned to MoTeC to have the OKM fitted. The OKM comes with an audio monitoring loom, the loom is fitted with 3.5mm stereo connector and EVOX main connector pins. For more information on configuring the M800 and the OKM to measure knock see the OKM manual.

Loom connection:

- **Pin 99 monitor out (red wire)**
- **Pin 100 monitor GND (black wire)**
- **Pin 101 monitor window (white wire)**

Input:

- **LA1S**
- **Knock window:**
- **IGN5**

MDC2

The MDC2 controls the centre differential hydraulic system. The MDC2 controls the pressure in the hydraulic accumulator and a valve that delivers hydraulic pressure to the centre diff. These notes apply to MDC2 hardware version 2 which can be identified by a 2 in a square on the serial number sticker. The MDC2 must use software version 205 or later. For further information on the MDC2 see the MDC2 user manual.

MDC2 CAN

The MDC2 requires channels to perform lock calculations, some coming from wired sensors and others from CAN. Of the CAN channels some are transmitted to the MDC2 from the M800 and some are received directly from the car such as wheel speeds form the ABS/WSS unit. The channels required from the M800 are throttle position and manifold pressure. The MDC2 transmits a range of

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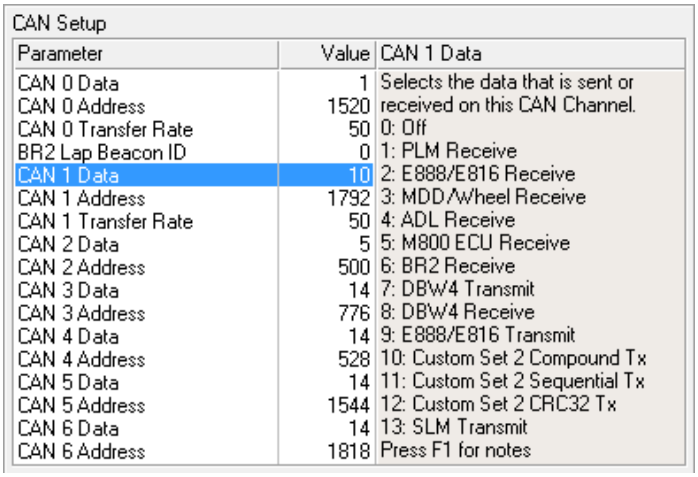
channels on CAN that can be received in a M800 or ADL to be used for diagnostic or logging purposes.

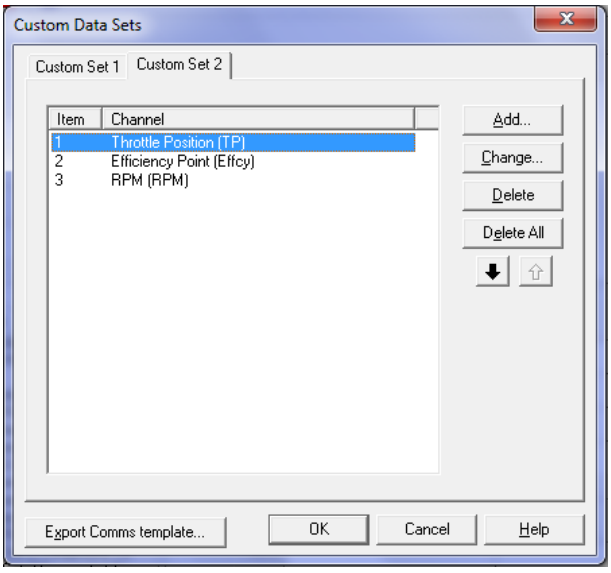
Transmitting CAN to MDC2

The start file for the EVO X plug in M800 by default is set up to transmit the required channels to the MDC2

One of the available CAN slots needs to configured to transmit a custom data set in compound mode to address 1792 (decimal)



The Custom data set need to be configured with channels throttle position, efficiency point and engine RPM in that order.



Receiving CAN Data from the MDC2

The M800 can receive data from the MDC2 using the cars CAN bus. A Spare CAN slot must be configured in mode 5 (M800 ECU receive) on address 500 (decimal) A range of channels can then be configured in the input setup. The channels available and their settings are:

Channel Name	Input	Calibration	Input	Value

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Steering	ECU2 9	Custom % 1 DP	0, 360	0, 360
Yaw Rate	ECU2 4	Custom Unitless 1 DP	0 ,1000	0, 100
Hydraulic Pressure	ECU2 7	Custom kPa 1 DP	0, 2000	0, 1000
Lock Percentage	ECU2 8	Custom % 1 DP	0, 1000	0, 100
Brake	ECU2 11	Unitless no DP	0, 127,128,129	0,0,1,1

AYC with MDC2 (GSR Only)

With a MDC2 installed in an EVOX GSR or any car with active yaw control (AYC) the control functions will be inactive and the rear diff will behave as an open diff.

Input/Output Test

It is important to carry out an output test and check that all sensors are working correctly prior to starting the engine. If outputs are not functioning or sensors are not reading correctly refer to the setup information in the Pin out Diagram.

Pin out Information

Using the Pinout Information

There are 2 pin out sections in this document; The M800 Plug-In pin out and the OEM ECU Pin out.

The M800 Plug-In Pin out describes the function of each M800 plug-In pin with a reference to the OEM pin number it is connected to. There is a description of its function and optional function where applicable, as well as notes on functional setup or calibration as necessary. Where there are one or more options for the pin, the option is marked with a # or ##. The corresponding OEM pin, function and setup notes refer to the parameters in M800 ECU Manager and are all marked with # or ## with any changes in link setup or vehicle modifications detailed.

The OEM ECU Pin out lists pins in order of the factory connector with corresponding MoTeC M800 Plug-In pins, functional description and typical wire colour.

The pin out numbering system is the same as in the Mitsubishi service manual. The pin numbers are shown in the following diagram looking into the ECU main connector.

Note: Do not refer to the pin numbers moulded into the back of the connectors as some of the numbers are repeated on each connector.

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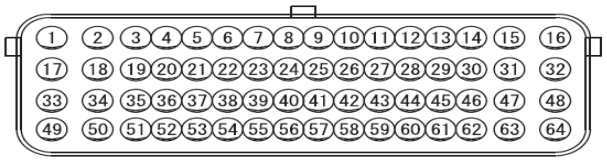
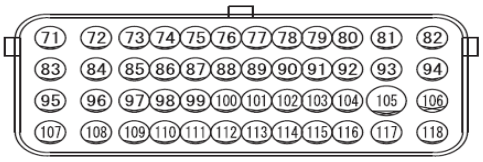
M800 Pinout





M800 Pin	OEM Pin No.	Standard Function	Optional Function	Setup Notes
Power				
12V		12v Switched (ECU Relay)		
GND	34	34. ECU Earth		
8V ENG		8V to OKM Module		
5V ENG	9	5V sensor supply		
0V ENG	13	OV sensor supply		
8V AUX	K-16	8V to internal comms connector		
5V AUX	B-3	5 V to internal barometer		
0V AUX	B-2	0V to Internal barometer		
Outputs				
INJ1	2	Injector Cylinder 1		
INJ2	18	Injector Cylinder 3		
INJ3	19	Injector Cylinder 4		
INJ4	3	Injector Cylinder 2		
INJ5	60	60. Alternator Control		**Function:** 134 Alternator Voltage Control Parameters: Proportional Gain: 5 Integral Gain: 6 Derivative Gain: 0 Aim Voltage: 13.5 Filter: 0 Frequency: 23 Polarity: 1 Output Mode: 1
INJ6	102	102. AC Relay		**Function:** 104

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M800 Pin	OEM Pin No.	Standard Function	Optional Function	Setup Notes
INJ7	1	1. Inlet Cam Control		**Function:** 117 Cam Control Parameters: Source Channel: 1 Proportional Gain: 0.80 Integral Gain: 0.3 Derivative Gain: 0.080 Dead Band: 0.4 Aim Source: 0 Frequency: 300 Polarity: 0 Low Limit: 75.0 High Limit: 100.0
INJ8	17	17. Exhaust Cam Control		**Function:** 117 Cam Control Parameters: Source Channel: 2 Proportional Gain: 1.00 Integral Gain: 0.1 Derivative Gain: 0.025 Dead Band: 0 Aim Source: 0 Frequency: 300 Polarity: 1 Low Limit: 6.0 High Limit: 30.0
IGN1	4	Ignition Cylinder 1		
IGN2	20	Ignition Cylinder 3		
IGN3	21	Ignition Cylinder 4		
IGN4	5	Ignition Cylinder 2		
IGN5	K-8	Knock Window (OKM)		**Function:** 122 Knock Window Requires OKM
IGN6	73	70. Power Hold (engine control relay)		**Function:** 118 Power Hold Parameters On Time: 30 Polarity: 0 Output Mode: 0

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M800 Pin	OEM Pin No.	Standard Function	Optional Function	Setup Notes
AUX1	16	16, DBW-		**Function:** 5 Drive By Wire
AUX2	15	15. DBW+		**Function:** 6 Drive By Wire Idle Control
AUX3	52, 53	52, 53. Boost Control		**Function:** 1 Boost Control Parameters Frequency: 20 Polarity: 0 Output mode; 0
AUX4	50, 118	50, 118. Spray Bars		**Function:** 114 Spray bars
AUX5	51, 96	51, 96. Fuel Pump		**Function:** 101 Fuel Pump Parameters Delay: 2 Polarity: 0 Output Mode: 0
AUX6	64	64, Lambda Heater		**Function:** 104 Parameters
AUX7		Centre diff lock request		**Function:** 3 Aux Table See notes
AUX8		Thematic Fan (Via CAN)		**Function:** 133 see notes Duty = 0% - Fan off Duty = 0%-50% -Fan low speed Duty = 50%-100% - Fan high speed
Inputs				
REF	8	8. Ref Sensor (Hall)		

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M800 Pin	OEM Pin No.	Standard Function	Optional Function	Setup Notes
SYNC	7	7. Sync Sensor (Hall)		**Sync Cam Position Setup:** Channel: 2 Offset: 369.3 Filter: 5 Zero: 0
AT1	26	26. Engine Temperature		Calibration: See calibration table
AT2	98	98. Air Temperature		Calibration: See calibration table
AT3	58, #108	58. Power Steering	#108. Brake Status	
AT4	89, #107	89. Air Temperature (MAF Sensor)	#107, Cruise control switch (ORB Select or spare input)	
AT5	85	85. Clutch Switch		
AT6	94	94. Oil Level Switch	#28. Trans Temp Sensor ##86. Speed Rail Switch	**Function:** 104 Parameters
AV1	10	10. Throttle Position		
AV2	11	11. Throttle Position 2		
AV3	45	45. MAP Sensor		Calibration: See calibration table
AV4	74	74. Throttle Position Driver		
AV5	77,	77. Throttle Position Driver 2		
AV6	B1 #62	Barometric Pressure Sensor	#62. Alternator input L	Calibration: #64
AV7	61, #K10	#61. Alternator input FR	#K10. Thermocouple input	
AV8	87	87. Mass Air Flow Sensor		Calibration #49
DIG1	92	92. Ignition Switch		**Function:** 104 Parameters : Logic Polarity: 1 Delay: 0 Latch: 0

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M800 Pin	OEM Pin No.	Standard Function	Optional Function	Setup Notes
DIG2	14	14. Inlet Cam Position		**Function:** 104 Parameters: Edge: 0 Offset: 557 Channel: 1 Teeth: 1 Zero: 0
DIG3	111	111. Spray Bar Input/ORB select		**Function:** 25 Parameters: Polarity: 0 Spray Bars: 1 Logging: 0
DIG4	36	36. Oil Pressure Switch		
LA1S	38, #K9	F38. Front Narrowband lambda	#K-9. Knock signal (with OKM)	
LA1P	39			
LA2S	47	47. Wideband Lambda		
LA2P	48	48. Wideband Lambda		
Communications				
RS232 TX				
RS232 RX				
CAN HI	56, 90	56. Spare pin 90. CAN HI		
CAN LO	55, 91	55. Spare pin 91. CAN LO		

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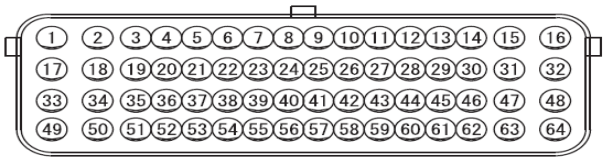
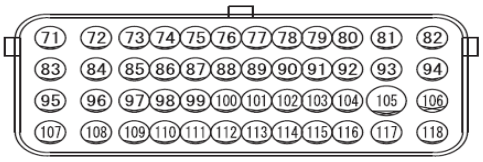
OEM ECU Pinout





OEM Pin	M800 Pin	Function	Wire Colour
1	INJ7	Inlet Cam Control	Violet
2	INJ1	Injector Cylinder 1	Green-White
3	INJ4	Injector Cylinder 2	Yellow-Black
4	IGN1	Ignition Cylinder 1	White-Red
5	IGN4	Ignition Cylinder 2	White-Blue
6	O/C	Starter relay 2	Blue-Red
7	SYNC	Exhaust Cam Position Sensor	Green-White
8	REF	Crank Angle Sensor	Red-Blue
9	5V-ENG	REF SYNC 5v	Red-Green
10	AV1	TP (Main)	Grey-Red
11	AV2	TP (sub)	Yellow-Pink
12	5V-ENG	TP 5v	Yellow-Red
13	0V-ENG	TP 0v	Yellow-Grey
14	DIG2	Inlet Cam Position Sensor	Grey-Blue
15	AUX2	DBW+	Light Green
16	AUX1	DBW-	Blue-White
17	INJ8	Exhaust Oil Control VSV	Black
18	INJ2	Injector Cylinder 3	Green-Red
19	INJ3	Injector Cylinder 4	Pink
20	IGN2	Ignition Cylinder 3	White-Black
21	IGN3	Ignition Cylinder 4	Black-Red
22			
23	0V-ENG	Exhaust Cam Sensor 0v	Red-Black
24	0V-ENG	REF 0v	Yellow-Violet
25	K-1	Knock Sensor Signal	Green
26	AT1	Engine Temp	White
27	0V-ENG	ET 0v	White-Black
28	AT6#	Trans Temp Sensor Signal	White-Green
29	0V-ENG	Trans Temp Sensor 0v	Black
30	0V-ENG	Inlet Cam Sensor 0v	Black-Yellow
31			
32	0V-ENG	SPARE PIN	MoTeC
33			
34	GND	Front Lambda Heater GND	Blue-Black
35	O/C	Rear Lambda Heater	Brown
36	DIG4	Oil Pressure Switch	Grey
37		Purge Control VSV	Brown-White
38	LA1-S	Front lambda sensor +	Red
39	LA1-P	Front lambda sensor -	Sky Blue
40	O/C	Rear Lambda +	Yellow
41	O/C	Rear Lambda -	O
42	0V-ENG	Detonation Sensor GND	Blue-Yellow

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OEM Pin	M800 Pin	Function	Wire Colour
43			
44	5V-ENG	MAP 5v	Blue
45	AV3	MAP	Yellow-Blue
46		MAP 0v	Black-White
47	LA2-S	SPARE PIN	MoTeC
48	LA2-P	SPARE PIN	MoTeC
49			
50	AUX4	Intercooler Water Spray	White-Green
51	AUX5	Fuel Pump Relay 1	Red-B
52	AUX3	No 1 Waste Gate VSV	Black-Blue
53	AUX3	No 2 Waste Gate VSV	Red-Yellow
54			
55	CAN-LO	SPARE PIN	MoTeC
56	CAN-HI	SPARE PIN	MoTeC
57			
58	AT3	Power Steer Input	Black-White
59			
60	INJ5	Alternator Control Output (G)	Yellow-Green
61	AV7#	Alternator Input (FR)	Red-White
62	AV6#	Alternator input (L)	White
63	VCAR	SPARE PIN	MoTeC
64	AUX6	SPARE PIN	MoTeC
71	GND	GND 15	Black
72	O/C	DBW +12v in	Brown-White
73	IGN6	Engine Control Relay Coil, active low	White-Blue
74	AV4	TPD (main)	Grey
75	5V-ENG	TPD 5v (main)	White-Green
76	0V-ENG	TPD 0v (main)	Blue-Black
77	AV5	TPD2(sub)	Yellow-Black
78	5V-ENG	TPD 5v (sub)	Yellow-Red
79	0V-ENG	TPD 0v (sub)	Brown
80	O/C	OBD connector	Yellow-Blue
81	GND	GND 16	Black-Red
82	VCAR	Power Source	White
83	GND	GND 15	Black
84	O/C	DBW power supply relay coil	Sky Blue
85	AT5	Clutch Switch (active low)	White-Red
86	AT6#	Speed Rail Switch	
87	AV8	MAF	Blue
88	0V-ENG	MAF 0v	Black-Blue
89	AT4	Air temp (MAF sensor)	Violet
90	CAN-HI	CAN HI	Green-White
91	CAN-LO	CAN LO	Yellow
92	DIG1	Ignition Switch	Pink
93	GND	GND 5	Black-White
94	AT6	Engine Oil Level Sensor (EU)	Red-White
95	0V-ENG	Cruise Control Input	Blue
96	AUX5	Fuel Pump Relay 2	Pink
97	0V-ENG	AT 0v	Black-Yellow

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OEM Pin	M800 Pin	Function	Wire Colour
98	AT2	Air Temp.	Green-Red
99	MON-OUT	Knock Monitor Output (with OKM)	Spare Pin
100	MON-GND	Knock Monitor GND (with OKM)	Spare Pin
101	MON-WIND	Knock Monitor Window Output	Spare Pin
102	INJ6	A/C clutch relay	Orange
103	O/C	onto OBD connector	Green
104	O/C	Battery Back-up	Red
105	106	Start SW	Red-Black
106	105	Starter Relay	Blue-Red
107	AT4#	Cruise Control Input	
108	AT3#	Brake Input	
109	TC-	Thermocouple input – (OKM)	Spare Pin
110	TC+	Thermocouple input + (OKM)	Spare Pin
111	DIG3	Auto Spray Bar Input	Blue-White
112	O/C	C47	
113	O/C	C47	
114	O/C	C47	
115	O/C	C47	
116	O/C		
117	O/C	C47	
118	AUX4	Manual Spray Bar Input	Blue-Yellow

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ECU Manager Setup

Parameter	Value
Injector Current	0.0
Number of Cylinders	4
Ref/Sync Mode (REF)	57
Crank Ref Teeth (CRT)	36
Tooth Ratio	40
Crank Index Position(CRIP)	265.0
Ref Sensor Type	1: Hall
Ref Sensor Edge Polarity	0 : Fall
Sync Sensor Type	1: Hall
Sync Sensor Edge Polarity	0 : Fall
Ignition Type (IGN)	1
Number of Coils (COIL)	4
Ignition Delay Time	50
Firing Order	1, 3, 4, 2

Calibration Tables

Engine Temperature Sensor (AT1)

Degrees C, 1 Decimal place

Temp	-10	-5	0	5	10	15	20	25	30	35	40	45	50
Input(V)	4.473	4.350	4.238	4.040	3.880	3.685	3.499	3.286	3.062	2.841	2.625	2.397	2.162

Temp	55	60	65	70	75	80	85	90	100	110
Input(V)	1.941	1.732	1.594	1.452	1.292	1.146	1.049	0.950	0.800	0.700

Air Temp Sensor (AT2)

Degrees C, 1 Decimal place

Temp	-10	-5	0	5	10	15	20	25	30	35	40	45	50
Input(V)	4.473	4.350	4.238	4.040	3.880	3.685	3.499	3.286	3.062	2.841	2.625	2.397	2.162

Temp	55	60	65	70	75	80	85
Input(V)	1.941	1.732	1.594	1.452	1.292	1.146	1.049

MAP Sensor (AV3)

MAP kPa

MAP	40	100	200	300	330
Input(V)	0.600	1.460	2.900	4.350	4.800

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Injector Battery Comp

Bat V	10	11	12	13	14	15
U sec	1440	1200	1060	920	820	720

Ignition Dwell Table

Bat V	8	9	10	11	12	13	14	15
Dwell	6.5	5.7	5.0	4.3	3.8	3.2	2.7	2.3

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Link Table

Links by link #	Option
LK8 Closed	*Lambda heater 12v on spare pin 63
LK8 Open	Pin 63 isolated
LK11 Closed	* LA2-P on spare pin 48
LK11 Open	Pin 48 isolated
LK4 Open, LK15 Open, LK1 Closed	*Engine Oil Level Sensor
LK4 Closed, LK15 Open, LK1 Open	Speed Rail Switch
LK4 Open, LK15 Closed, LK1 Open	Gearbox Temp Sensor
LK10 Closed	*0V on spare pin 32
LK10 Open	Pin 32 isolated
LK9 Closed	* Lambda Heater (AUX6) on spare pin
LK9 Open	Pin 64 Isolated
LK6 Open, LK3 Closed	*Air Temp Sensor (MAF)
LK6 Closed, LK3 Open	Cruise Control Switch
LK19 Open, LK18 Closed	*Knock input on LA1-S
LK19 Closed, LK18 Open	Front Narrow Band Lambda
LK14 Closed, LK16 Open	* Alternator (FR) input on AV7
LK14 Open, LK16 Closed	EGT input from OKM on AV7
LK20 Closed	*Front Narrow Band Lambda Heater
LK20 Open	No Lambda Heater GND
LK12 Closed	*LA2-S on spare pin 47
LK12 Open	pin 47 isolated
LK2 Closed	*CAN Terminator Resistor
LK2 Open	No CAN Terminator Resistor
LK13 Open, LK7 Closed	* M800 BAP Sensor on AV6
LK13 Closed, LK7 Open	Alternator (L) input on AV6
LK17 Closed, LK5 Open	*Power steering input on AT3
LK5 Closed, LK17 Open	Brake switch input on AT3

- **Denotes the default setup**

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